St Joe Geographic Assessment
St. Joe, St. Maries and Little North-fork of the Clearwater river
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Mark R. Mousseaux, IPNF Forest Botanist

I. Threatened, Endangered, Sensitive and Rare Plants (Plant Species of Concern)

A. Historic:

Low elevation canyons on the west slope of the Bitteroots, like the St. Joe and Little North-fork of the Clearwater contain a forest ecosystem that is unique and diverse. While the flora has many similarities to ecosystems west of the cascades (Coastal), it also contains plant species near the southern limits of their range (Boreal species), plant species only found in the western Rocky mountains and greatbasin (Western), and a few plant species only found locally (Local endemics). A small number of species (especially ferns and allies) are found through-out the world (circumboreal or circumpolar). Some of the flora and angiosperm plant families have been here since the late Miocene (12 million years ago), most noteably Acer (Maple) and Populus (Populars) (Steele, 1971). Researchers have studied North Idaho ecosystems (most noteably the St, Joe, and Clearwater drainages) and consider portions of these ecosystems relics of conditions that were once more widespread during the Miocene and early Pliocene era's; conditions that now only occur west of the cascade range in Washington and western British Columbia. The eastward extent of this Miocene forest that ran from the coast into Northern Idaho was isolated by changing climatic patterns resulting from the geologic uplift of the Cascades, and the elimination of vegetaion from the Columbia basalt flows in Central and Eastern Washington, Oregon and Western Idaho, complete in the Miocene (Lichthardt, Moseley 1994). It is generally thought that by the late Pliocene and early Pleistocene (1 to 2 million years ago) much of our "modern" vegetation was present in the interior northwest, and much of it survived the climatic and geologic uplift events of the Pilocene and the climatic and glacial events of the Pleistocene.

The exact distribution and types of plant communities present within the St. Joe ecosystem prior to the arrival of Europeans is not well documented but can be generally inferred.

1) Riparian Communities:

Of main interest are riparian and moist forest communities, as these communities supported the majority of plant species that are considered species of concern. These riparian communities can be broadly categorized into three main types:

> Low elevation (generally < 2500 ft) very broad floodplain deciduous communities dominated by black cottonwood or quaking aspens, containing red alder, hawthorne, thinleaf alder and understories of sedges, ferns and other hydrophytic herbaceous vegetation. This includes willow mosaics and wet sedge and grass meadows. These communities dominated the lower St. Joe river from Falls creek to the southern shores of Lake Coeur d'Alene, intermittently from Falls creek up river to Marble creek, and along the St. Maries river from Clarkia Idaho downstream. About 24,800 acres (or 1.8% of the total land area) were represented by these communities, nearly all of it on what is now private land.

Mid-elevation (generally < 4500 ft) narrow to broad western redcedar and western hemlock riparian communities containing white pine, grand fir, water birch, and dogwood with understories of lady fern, maiden-hair fern, oak-fern, devil's club, arrow-leaf groundsel, and ginger. These communites dominated the majority of the St. Joe, St. Maries and little north-fork Clearwater river drainages and tributaries, accounting for 35,350 acres on both federal and private lands (2.5%). The majority of western redcedar "oldgrowth" was present in these communities.

High elevation (generally > 4500 ft) narrow riparian communities dominated by sub-alpine fir, mountain hemlock containing engelmann spruce, sitka alder, and understories containing fool's huckleberry, labrador tea, twisted-stalk, arrowleaf groundsel, canby's licorice root, and bluejoint reedgrass. Includes high elevation riparian willow and sedge complexes. These communities were more common at higher elevations in the middle and upper St. Joe and along the little north-fork of the Clearwater. About 10,500 acres (.7%) of the St. Joe ecosystem was represented by these communities, the majority of it on lands that are now under federal ownership.

Table 1. summarizes the number of estimated riparian acres by each LAA.

2) Historic riparian disturbance:

Historically, approximately 20% of the western redcedar riparian communities (7000 acres) were disturbed at any one time and in earlier seral states, mostly due to wildfires. Conversely, 28,200 acres, 80% of all western redcedar riaprian communities or 2.6% of the total landscape was in mid to late seral cedar riparian communities. Lieberg (1887) commented that the St. Joseph [Joe] basin orginally contained the largest continuous body of old growth in the northern portion of the state, prior to the fires in the 1880's. Historically, we had a dynamic pattern of localized extinctions (from disturbance) of riparian plant populations (including species of concern) followed by recolonization from nearby undisturbed areas.

Deciduous communities were by their very nature periodically disturbed by flooding. Nearly 25,000 acres of the lower St. Joe and St. Maries rivers were occupied by climax deciduous forests (35% of all riparian acres). Pelt records from the 1830's (Heron and Kittson, 1831) document large numbers of beaver and muskrat pelts taken by the Coeur d'Alene Indians in the St. Joe ecosystem, evidence for the large amount of deciduous habitat that supported these animals. These communities were much influenced by activites of beavers for the creation, stabilization and maintenance of wet habitats and plant communities.

A smaller percentage of the subalpine fir riparian communities were disturbed at any one time (10% or 1000 acres), again mostly by wildlifes, and also by seasonal avalanches.

Historically approximately 4% of the land area was in mid to late seral riparian communities (deciduous, cedar and sub-alpine) that potentially supported many of the riparian species of concern. The following table summarizes the estimated acreage that supported species of concern throughout the St. Joe. Basin.

Table 1. Estimated historic riparian communities by Zone and LAA (acres)

St Maries Zone:

LAA	Deciduous	Subalpine	Redcedar	% of Total Area
11	142	158	1154	3.3
12	775	42	1847	7.1
13	7	10	1142	4.9
14	1437	83	2975	6.8
15	2500	10	3840	4.5
Sub-tot	4861	303	10958	5.2

Lower St. Joe Zone

LAA	Deciduous	Subalpine	Redcedar	% of Total Area
21	0	127	7	.900
22	0	42	823	.96
23	0	32	289	1.5
24	0	267	872	2.5
27	19810	123	4653	12.5
Sub-tot	19810	591	5903	8.9

Middle St. Joe Zone

LAA	Deciduous	Subalpine	Redcedar	% of Total Area
31	0	304	701	2.3
32	0	136	1198	3.8
33	0	394	3137	4.7
34	0	163	1782	3.6
35	0	159	905	2.4
36	0	145	314	1.5
37	0	140	1356	3.3
38	209	5	324	2.9
39	15	40	1258	3.6
Sub-tot	224	1486	10975	3.3

Upper St. Joe Zone

LAA	Deciduous	Subalpine	Redcedar	% of Total Area
41	0	4440	113	6.2
42	0	887	420	3.2
43	0	154	475	2.5
Sub-tot	0	5481	1008	4.7

Little North-fork Zone

LAA	Deciduous	Subalpine	Redcedar	% of Total Area
51	0	169	1250	4.5
52	0	462	987	3.8
53	0	1110	936	3.9
54	0	344	2186	4.3
55	0	524	1151	3.3
Sub-tot	0	2609	6510	3.9

	Deciduous	Subalpine	Redcedar	% of Total Area
Total	24895 (1.8%)	10470 (.77%)	35354 (2.6%)	5.2%

Grand Total All Riparian areas
70696 acres 5.2% of total geographical area.

3. Moist Forest Communities

These were wet, mid to late seral stands of western redear and western hemlock that were adjacent (just upslope) to riparian areas and contained many of the same riparian understory species and species of concern. The exact historical acres is not known, but is estimated to have been at least 10% of the St. Joe or approximately 136,000 acres.

4. Xeric Plant Communities:

Another important historic community type for plant species of concern was dry, rocky, open areas in ponderosa pine and Douglas-fir communities on southerly, steep slopes up to 4500 ft dominated by understories of Idaho fescue, bluebunch wheatgrass, and containing lesser amounts of snowberry, oceanspray, white spiraea and ninebark. The majority of this type existed along the south slopes of the St. Joe river corridor, major tributaries and along the bluffs of St. Maries river. Lieberg (1899) classified 10% of the St. Joseph [Joe] basin as Yellow pine type (Ponderosa pine), mostly in the lower portions of the basin (St. Maries and lower St. Joe). The most xeric of these communites supported plant species of concern, approximately 21,000 acres or 1.5% of the total St. Joe ecosystem. These communites were maintained by edaphic conditions (shallower soils, south aspects and low moisture capacity) and periodic wildfires.

5. Sub-alpine communities:

Another historic community type for plant species of concern was open sub-alpine fir and white-bark pine communities at high elevations (>5000 ft) containing understories of beargrass, grouse whortleberry, smooth woodrush and sub-alpine herbaceous vegetation. This also includes non-forested sub-alpine parklands. Lieberg (1899) classified 19.9% of the St. Joe as Subalpine type. The communities that supported plant species of concern are estimated to be about 20% of the subalpine type, communities only represented at the highest slopes, ridges and peaks within the St. Joe ecosystem. Approximately 50,000 acres (3.5% of St. Joe ecosystem) are represented by these communites, nearly all on federal lands.

B. Current Condition:

While the exact number is not known, somewhere between 1200 and 1500 vascular and non-vascular plant species representing about 400 genera exist within the ecosystem. Of these, about 40 vascular species are species of concern, including 21 plants listed by the Forest Service as "sensitive"; approximately 3.0% of the flora. The majority of these species are found in riparian communities, in wet micro-sites within moist forest communities and many have coastal affinities.

1) Riparian Communities:

-Coastal Disjuncts:
The high precipitation and moderate temperatures present within portions of the St. Joe and Clearwater ecosystems closely parallel those of the west slope of the Cascades and many "coastal disjunct" plant species have persisted in the St. Joe ecosystem. A disjunction occurs when a population segement is separated by some distance from the main or prinicipal population, and the species dispersal capacity can not account for this separation (Lorain, 1988). Most of these species are present within riparian communities and wet microsites within moist forest communities. Many of these species are quite common, like western redcedar, western hemlock, Rocky Mountain maple (Acer glabrum) and fool's huckleberry (Menziesia ferruginea); others are uncommon like red alder (Alnus rubra), Anderson's holly-fern (Polystichum andersonii) and cascade oregon grape (Berberis nervosa); and others are rare like red-flowered currant (Ribes sanguineum), western star-flower (Trientalis latifolia) and deerfern (Blechnum spicant). Appendix A contains a list of many common, uncommon and rare plant species that have coastal affinites. The following are coastal disjunct plant species of concern:

Red Alder (Alnus rubra)
Oregon bentgrass (Agrostis oregonensis)
Deerfern (Blechnum spicant)
Cascade oregon grape (Berberis nervosa)
Henderson's sedge (Carex hendersonii)
beaked hazel-nut (Corylus cornuta)
Suksdorf's hawthorn (Crataegus suksdorfii)
Bleeding heart (Dicentra formosa)
White shooting star (Dodecatheon dentatum)
Phantom orchid (Eburophyton austinae)
Pacific ninebark (Physocarpus capitatus)
Anderson's holly-fern (Polystichum andersonii)
Red-flowered currant (Ribes sanguineum)
Sierra woodfern (Thelypteris nevadensis) [suspected]
western starflower (Trientalis latifolia)
high-bush cranberry (Viburnum edule)
redwoods violet (Viola sempervirens)

Chickweed monkey flower (Mimulus alsinoides) is another coastal disjunct recently discovered in Idaho (Mousseaux, 1996). It is not a true riparian species but is listed here because of its unique habitat; seasonally wet, north slope, mossy cliffs.

-Endemics:
Several plant species that occur within riparian communities are local endemics, species that exist here and nowhere else in the world:

Contance's bittercress Cardamine constacei
Case's fitweed Corydalis caseana
Lieberg's tauschia Tauschia tenuissma

-Western endemics Riparian species rare in Idaho and confined to the western United States. All these species are rare throughout their range.

clustered lady's slipper (Cypripedium fasciculatum)
upswept moonwort (Botrychium ascendens)
dainty moonwort (Botrychium crenulatum)
triangle moonwort (Botrychium lanceolatum)
western goblin (Botrychium montanum)
northwestern moonwort (Botrychium pinnatum)
Simcoe's starwort (Stellaria simcoei)

-North American or Global Species Riparian species rare in Idaho but present throughout North America or present globally:

maidenhair spleenwort (Asplenium trichomanes) [suspected to occur]
Mingan's moonwort (Botrychium minganense)
least moonwort (Botrychium simplex)
wool-grass (Scirpus cyperinus
northern starwort (Stellaria calycantha)

2) Current condition of riparian communities and species of concern:

Since the arrival of european man in the St. Joe ecosystem in the 1800's, much of the riparian communities have been irretrievably lost, impacted or modified to the extent that they are unable to support the potential historic vegetation. The major impact to these diverse communities has been riparian roading, including corduroy and skid roads, railroads, conversion to agriculture and pasture lands (on private lands), city and town development, flood control (diking) and intensive logging practices. Change has occurred in all riparian communities in all LAA's reducing the capability of these areas to support riparian plant species of concern (see Table 3.)

-Deciduous Communities:
Deciduous communites have experienced the largest decrease, with an estimated 85% of the historic acres lost, primarily to agriculture and pastureland on private lands on the lower St. Joe and along the St. Maries river. What remains is intensely fragmented. Losing these deciduous communities (and large populations of beavers) has resulted in a more mesic riparian condition and a decrease in the potential of these systems to support species of concern.

-Western redcedar and hemlock riparian communities:
Historically these were the most productive and species rich areas in the St. Joe basin. Much of the St. Joe's "oldgrowth" cedar/hemlock stands were associated with riparian areas, as well as large diameter western white pine. Most of the rare coastal disjunct plant species are found in these communities. In the early years of settlement these were the easiest areas to road and the

most productive areas to harvest. Early roads and railroads were punched right up the riparian channel in many cases, causing irreversible damage to the existing vegetation and productivity of the sites. Riparian skidding, corduroy roads, splash dams, flume logging and logging drives further caused irretrievable damage to riparian vegetation along major tributaries of the St. Maries, St. Joe and the main fork of the St. Joe. Many tributaries later entered by the US forest service and timber corporations removed 1/2 the riparian vegetation by building a road on one side of the narrow riparian zones. Many riparian communities that are now inaccessible by vehicles, have been roaded or experienced severe impacts at one time.

The amount of intact cedar/hemlock riparian communities along the main St. Joe river corridor has decreased 55% from historic levels, mostly due to the railroad, main St. Joe river road and intense historic logging. The amounts of intact cedar/hemlock riparian communities for the rest of the St. Joe, St. Maries and Little North-fork of the Clearwater has decreased 56% (see table 2.). Over all there has been a decrease of 55.9% in the acres of intact riparian communities that once supported plant species of concern or had the potential to.

Table 2. Percent decrease in acres of western redcedar/hemlock riparian communities for species of concern.

Zone and Laa's	St. Joe Corridor	All other Riparian	Total
St. Maries (laa's 11-15)	na	.73	.73
Lower St. Joe (laa's 21, 27)	.80	.77	.77
Middle St. Joe (laa's 31-39)	.59	.43	.45
Upper St. Joe (laa's 41-43)	.29	.21	.24
Little NF Clwtr (laa's 51-55)	na	.31	.31
Total decrease	.55	.56	.56

-Sub-alpine Riparian Communities:
These riparian communities that support plant species of concern have been the least impacted of all riparian types. These communities have seen a 10.7% decrease in intact riparian communities, mostly due to riparian roading. The largest change has occurred in the Middle St. Joe with a 25% decrease in the sub-alpine riparian acres, mostly in laa's 35-37, lands of mixed corporate and federal ownership. The upper St. Joe has experienced a 8% decrease in intact riparian communities, again mostly by roading. The majority of riparian communities above 4500 feet are intact and are representational of historic vegetational conditions and have a potential to support plant species of concern adapted to these environments.

-Summary of riparian communities current condition
Large changes have occurred across the St. Joe, St. Maries and Little North-fork of the Clearwater drainages with respect to riparian communities. Over 50% of the riparian communities have experienced intense, irretrievable impacts caused by man. It has been estimated that intact riparian communities occupied over 5% of the St. Joe ecosystem prior to 1800, and now occupy about 2% (see table 3.). Assuming that natural stochastic disturbances like fire, avalanches, floods and landslides, affected 20% of the riparian communities at any one time, this is still over a 50% decrease in intact riparian communities capable of supporting riparian plant species of concern.

Table 3. Percent decrease in intact riparian communities by Zone and LAA for species of concern.

St Maries Zone:

LAA	Deciduous	Subalpine	Redcedar	% of All Riparian
11	.90	.5	.75	.74
12	.85	.1	.85	.84
13	.86	.1	.70	.70
14	.85	.1	.70	.74
15	.90	.1	.70	.78
Sub-tot	.88	.31	.73	.77

Lower St. Joe Zone

LAA	Deciduous	Subalpine	Redcedar	% of All Riparian
21		0	.01	.007
22		.1	.5	.36
23		.02	.35	.32
24		.05	.76	.59
27	.85	.1	.80	.84
Sub-tot	.85	.05	.77	.81

Middle St. Joe Zone

LAA	Deciduous	Subalpine	Redcedar	% of All Riparian
31		.30	.60	.51
32		.05	.49	.44
33		.15	.61	.56
34		.05	.37	.34
35		.40	.32	.33
36		.60	.37	.44
37		.40	.44	.43
38	.80	.01	.10	.37
39	.80	.01	.30	.30
Sub-tot	.80	.25	.45	.44

Upper St. Joe Zone

LAA	Deciduous	Subalpine	Redcedar	% of All Riparian
41		.09	.22	.09
42		.05	.32	.14
43		.01	.17	.13
Sub-tot	0	.08	.24	.10

Little North-fork Zone

LAA	Deciduous	Subalpine	Redcedar	% of All Riparian
51		.01	.70	.62
52		.01	.60	.41
53		.15	.25	.20
54		.05	.15	.14
55		.01	.01	.01
Sub-tot	0	.07	.31	.25

Total	Deciduous	Subalpine	Redcedar	% of All Riparian
Decrease	.86	.11	.56	.59

Percent of total St. Joe area = 2.1%.
Intact riparian communities 41% of historic levels across the St. Joe GA

The largest change has been the loss of 85% of deciduous cottonwood communities on the lower St Joe and St. Maries river, mostly due to agricultural and private development. The next largest modification of the historic riparian communities that supported species of concern was the loss of 54.7% of intact western redcedar and western hemlock communities along the St. Joe river corridor, due to riparian roading, railroading and intensive early logging practices. About 56% of all other intact western redcedar and western hemlock riparian communities across the ecosystem have been lost, again due to riparian roading, railroading, riparian skidding, and logging practices that have irretrieveably modified these communities and the ability of these sites to support plant species of concern. The largest impacts have occurred in the St. Maries and Lower St. Joe Zones, with lesser impacts on the middle St. Joe and Little North-fork of the Clearwater. The least impacts to riparian cedar communities have been on the Upper St. Joe Zone, but this area had only about 3% of the total riparian cedar acres historically. The least impacted riparian zones have been the Sub-alpine riparian communities. This has always been a smaller riparian component across the ecosystem (acres are few on the St. Maries and Lower St. Joe), but 25% of the sub-alpine riparian zones have been modified in the Middle St. Joe. The Little North-fork of the clearwater and the Upper St. Joe historically had the most sub-alpine riparian communities and these are basically intact with decreases of 7% and 3% respectively.

The effects to riparian plant species of concern from the modification and loss of riparian habitats has been severe. Most of our existing riparian rare plant populations are fragmented and isolated from other populations in remaining patches of less disturbed and undisturbed riparian communities. These populations no longer are functioning as a metapopulation. A metapopulation is a collection of interdependent populations affected by recurrent extinctions and linked by recolonization (Murphy et. al 1990). The historical, continuous, intact riparian areas were the "links" between segements of these rare plant populations and now many of these links are severely modified or in the case of the main fork of the St. Joe, gone. Essentially, many of these populations existing in isolated tributaries are now independent populations, with a reduced (or no) likelyhood of breeding with other populations in other drainages. Given the small population sizes of many of these species, long term existence is uncertain (see Table 4.).

Table 4. Number of occurrences and population numbers for riparian species of concern (populations currently monitored)

Species	Occurrences	Total plants
Deerfern (Blechnum spicant)	6	53
Upswept moonwort (Botrychium ascendens)	1	100
Least moonwort (Botrychium simplex)	1	26
Mingan moonwort (Botrychium minganense)	4	139
Western goblin (Botrychium montanum)	1	30
Case's fitweed (Corydalis caseana)	5	1000
Contance's bittercress (Cardamine constancei)	19	15,034
Clustered lady's slipper (Cypripedium fasciculatum)	11	91
White shooting star (Dodecatheon dentatum)	9	2150
Phantom orchid (Eburophyton austiniae)	7	45
Chickweed mimulus (Mimulus alsinoides)	2	175
Anderson's holly fern (Polystichum andersonii)	2	300
Red-flowered currant (Ribes sanguineum)	2	56
Western starflower (Trientalis latifolia)	3	500

3. Current condition of Moist Forest communities:

Moist forest habitats adjacent to riparian areas (wet cedar/hemlock communities in mid-late seral states) also have a high potential to support species of concern. These communitiews have experienced moderate impacts from early logging, reducing the potential for species of concern. It is estimated that 10% of the St. Joe basin originally contained these communities, less than 2% remains relatively intact. The majority of the remaining areas are on federal lands, about 23,600 acres or 4% of federal lands. About 13,400 acres of this has "old growth" designation and will be protected. Few acres remain on non-federal lands, probably less than 3,000 acres (.05%).

4. Current condition of dry xeric communities:

These dry, rocky, open communities exist along the south slopes of the St. Joe river, major tributatries, and along the bluffs of the St. Maries river corridor. They generally are small openings, with shallow soils that have a low (or no) overstory conifer component, have few shrubs, and contain mostly xeric grasses, annuals and perennial herbaceous vegetation. They frequently are disturbed by big game (elk and deer) and are often present in areas that are classified as winter range. All of the species of concern in these communities are local endemics.

-Local Endemics:
Howell's gumweed (Grindelia howellii)
bank monkey flower (Mimulus clivicola)

Bank monkey-flower is normally found in areas with moderate to steep slopes (>45%), and over 37 occurrences containing over 8000 plants occur on the Lower, Middle and Upper St. Joe. There are no known occurrences on the St. Maries or Little North-fork of the Clearwater but habitat is present (see table 5.). Fire suppression seems to have had little effect on the structure and composition of communities containing bank monkey-flower and fire potentially could benefit this species.

Howell's gumweed is restricted to a single population on the Bluffs of the St. Maries river with the rest of the population in western montana. The effects of fire on this species is not well understood.

Table 5. Existing potential habitat for xeric plant species of concern.

Zone	Acres
St. Maries	3741
Lower St. Joe	4080
Middle St. Joe	8250
Upper St. Joe	795
Little No. Fork Clwtr	4271
Total	21,137

It appears that with the the exception of a few roads, trails, and some historic domestic animal grazing, these communities have remained relativly intact compared to historical patterns and still have a high potential to support xeric plant species of concern. The biggest threat to these communities is noxious weed infestations that can compete with these species for water, space and nutrients. On the St. Joe, approximately 21,100 acres or 1.5% of the

total land area contain xeric communities that can support these species of concern. Based habitat preference and stand information, about 50% of these areas are on federal land, 305 stands on about 10,600 acres.

5. Current condition of high elevation communities:
These are open high elevation sub-alpine fir and whitebark pine communities, and non-forested sub-alpine balds.

-Coastal disjuncts high elevation plant species of concern with coastal affinities:
Candystick (Allotropa virgata) [suspected]
California sedge (Carex californica)
Tweedy's ivesia (Ivesia tweedyi)
white Rhododendron (Rhododendron albiflorum)
lance leaved Sedum (Sedum rupicolum)

-Western endemics:
Bourgeau's milkvetch (Astragalus bourgovii)
Dryland sedge (Carex xerantica)
subalpine larch (Larix lyallii)
whitebark pine (Pinus albicaulis)

With the exception of a few ridgeline roads, trails and recreation sites, these communities are little changed from historical conditions. Of the estimated 50,000 acres (3.5% of the St. Joe) that were present prior to 1800, probably less than 1% has been negatively impacted. Based on habitat preferences and stand information, the high elevation species of concern have the potential to occur on 45,900 acres or about 6.4% of federal lands on the St. Joe. The remaining areas on non-federal lands are also relatively intact.

C. Trends and conclusions for plant species of concern and associated communities.

1) Riparian Communities:

The major downward trends in communities supporting plant species of concern have been major declines in intact deciduous and western redcedar riparian communities, and lesser declines in sub-alpine riparian communities. Approximately 59.6% of all the riparian communities within the St. Joe have been severely impacted or altered to the point where they no longer have the potential to support plant species of concern. The major impacts have been in the Lower St. Joe, (81 % decrease) mainly on non-federal lands; the St. Maries Zone, (77% decrease) mainly on non-federal lands, The Middle St. Joe (44% decrease) mainly on federal lands; the Little North-fork of the Clearwater (24.6% decrease) mostly on non-federal lands; and the Upper St. Joe (10% decrease), nearly all federal land.

The remaining, intact deciduous riparian communities capable of supporting species of concern are on private lands mostly on the lower St. Joe and a little on the St. Maries Zone. These communities are at risk because of further development and fragmentation and a long term downward trend is anticipated.

Most of the riparian species of concern are found in western redcedar and western hemlock riparian communities. The few remaining, intact riparian western redcedar communities capable of supporting species of concern on <u>non-federal lands</u> is expected to continue to decline through time. Current state guidelines protecting riparian areas (Stream Protection Zones) are liberal enough to allow for modifications that can affect the potential for riparian plant species of concern.

The majority of the remaining intact western redcedar riparian communities are on <u>federal lands</u>, especially within the middle St. Joe and little North-fork of the Clearwater, and lesser amounts on the St. Maries, Lower St. Joe and Upper St. Joe. New Riparian Habitat Conservation Area (RHCA) guidelines for federal lands are sufficient to protect the remaining wetern redcedar communities and the plant species of concern that they support. However, because of fragmentation and the loss of riparian connectivity between populations, long term declines in population viability for some of these species are anticipated, especially given the small population sizes of many existing populations.

The majority of the remaining sub-alpine riparian communities capable of supporting subalpine riparian species of concern are on federal lands and RHCA guidelines will protect these species, and communities.

2. Moist Forest communities adjacent to riparian areas.

Based on habitat preferences, stand conditions and habitat type information from stand records, wet cedar/hemlock communities that are immediately adjacent to riparian zones account for 4% of federal lands that could still support many of the riparian species of concern. Most of these stands are in mid to late seral states, some are classified as old growth, and most have had only minor impacts in recent history. The trend for these communities and associated species of concern on federal lands is stable and slightly increasing, as

future management activites give increased emphasis to retaining these communities. Few remaining acres occur on non-federal lands, and a downward trend is expected as these habitats are further modified by timber harvests, roading, and development.

3. Dry xeric communities:

The current condition and long term trends appear stable for xeric communities and the associated species of concern. Re-introducing fire into these dry sites will probably benefit bank monkey flower (Mimulus clivicola) by the creation of un-occupied habitat if adjacent habitat is occupied and re-colonization occurs. Current monitoring of Howell's gumweed (Grindelia howellii) is occurring and these populations appear stable, however a very small percentage of the population reproduces and the long term effects of this condition is not clear at present. The effect of fire on this species is not clear.

4. Sub-alpine high elevation communities:

The current condition and long term trends for these communities and associated species of concern appears stable and dont seem to have changed from historical levels. Minimal future impacts to populations are expected from trails and recreation. One exception is white bark pine populations that are in decline from an introduced pathogenic fungi. The long term trend for this species is downward and the effect of the loss of this component to the community is not known.

5. Botanical surveys

Few extensive botanical surveys have been done within the St. Joe ecosystem since the first European's arrived in the 1800's. A majority of the St. Joe ecosystem and little North Fork of the Clearwater are still botanically unexplored. Early botanical surveys and collections by C. Piper, W.H. Baker, C.R. Stollinger, H.J. Rust, J. Lieberg, and J.H. Christ were mostly confined to the lower portions and main corridor of the St. Joe and St. Maries river, along roads, railroad corridors and the shores of Lake Coeur d'Alene. Some work has been done by academic Botanists in the last 30 years (H. St. John, Washington State University; F.D. Johnson and D. Henderson University of Idaho) but again usually in easily accessible, localized areas. The Forest Service has done some botanical surveys, mostly confined to Timber Sale areas since 1989, areas of easy access (main roads), Research Natural Areas and other special interest areas like the Hobo Cedar Grove Botanical area. Plant association and habitat type classification work (Daubenmire and Daubenmire, 1968; Cooper et. al, 1991) descibed and sampled the dominant plant communities, but this involved a very small portion of the ecosystem. Many incidental and unique communities and some of the most species-rich and diverse communities (i.e. riparian communities) were not sampled.

The potential for new populations of exisiting species of concern is high especially in intact (and unsurveyed) riparian communities along the Middle and Upper St. Joe and Little North-fork of the Clearwater. New plant species are still being discovered. If botanical surveys continue, and more populations are found and protected, the potential to reverse the downward trends for riparian plant species of concern will be increased.

Summary of remaining habitat for species of concern:

The majority (79.6%) of remaining high potential habitat for all species of concern remains on federal lands. Approximatley 15.7% of federal lands have a high potential to support species of concern. Below are the estimated acres for federal and non-federal lands that have a high potential to support species of concern:

Community type	Federal	Non-fed	Total
Riparian:	20,000	8,500	28,500
Moist Forest:	23,600	3,000	26,300
Xeric:	10,600	10,400	21,000
Subalpine:	45,900	4,100	50,000
Total:	100,100	26000	125,800
Percent of Ecosystem	7.36%	1.91%	9.25%

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3. Strategy:

In order to manage plant species of concern including Threatened, Endangered and Sensitive (TES) plants for federal lands on the St. Joe, it is important to move from the traditional single species, single location approach to one involving species groups (guilds) and plant communities. The single species and single location approach to analysis and management is not feasible because: 1) the analysis area is very large, about 1,359,842 acres (about 47% federal lands) and the number of possible single point locations for each species is very large; 2) a very small percentage of the area have had complete botanical surveys (less than 3%), being confined mostly to areas on Federal lands that have had activities since 1989, incidental finds off main trails and recreational areas and historical surveys of lower elevations on private lands and, 3) The true extent of population occurrences and species distribution within the ecosystem is unknown.

The species of concern can be aggregated into 3 species guilds that share common habitat requirements, i.e., habitats that have a high potential to support members of the respective guild. Habitat information was derived from existing sensitive plant populations on the St. Joe and extrapolated from populations existing on other National Forests within the region. It is important to realize that these guilds are artifical creations based on the dominant plant communities and habitat types associated with these known populations, they are not all inclusive. The level of genetic variation in plant species and populations can be quite variable, enabling certain individuals, or sub-populations to exist in habitats that are outside the normal range of variability. While these popultions are important from a genetic and evolutionary perspective and should not be discounted, management efforts to locate, maintain, or enhance populations should be concentrated within plant communities on habitat types that are within the normal range of variability.

1. Guild definition:

Wet Forest and Riparian guild (WFG): This species guild includes known and suspected populations of riparian and wet forest species of concern, including listed sensitive plants.

Listed Sensitive plants:
Agrostis oreqonensis (oregon Bentgrass)
Asplenium trichomanes (maidenhair spleenwort) [suspected]
Blechnum spicant (deerfern)
Botrychium ascendens (upswept moonwort)
Botrychium crenulatum (dainty moonwort) [suspected]
Botrychium lanceolatum (triangle moonwort) [suspected]
Botrychium minganense (Mingan moonwort)
Botrychium montanum (western goblin)
Botrychium pinnatum (northwestern moonwort) [suspected]
Botrychium simplex (least moonwort)
Cardamine constancei (Constance's bittercress)
Carex hendersonii (Henderson's sedge)
Cypripedium fasciculatum (clustered lady's slipper)
Thelypteris nevadensis (Sierra woodfern) [suspected]
Trientalis latifolia (western starflower)

Other species of concern:

Alnus rubra (red alder)
Berberis nervosa (Cascade oregon grape)
Corydalis caseana (Case's fitweed)
Corylus cornuta (beaked hazelnut)
Crataegus suksdorfii (Suksdorf's hawthorne)
Dicentra formosa (Bleeding heart)
Dodecatheon dentatum (White-shooting star)
Eburophyton austiniae (Phantom orchid)
Physocarpus capitatus (Pacific ninebark)
Polystichum andersonii (Anderson's holly fern)
Ribes sanguineum (Red-flowered current)
Scirpus cyperinus (wool-grass)
Stellaria calycantha var. calycantha (northern starwort)
Stellaria simcoei (Simcoei Mt. starwort)
Tauschia tenuissima (Leiberg's tauschia)
Viola sempervirens (Redwoods violet).

The WFG habitats includes all riparian areas, and stands occurring at elevations less than 4500 feet containing wet habitats in the cedar and western hemlock habitat type series. The WFG specifically includes (from wet to dry): western redcedar/devils club to western redcedar/ginger habitat types (HT codes 540-560) and western hemlock/oak-fern to western hemlock/ginger habitat types (HT code 565, 575-578), in mid to late seral states. Moderately disturbed riparian communities also have the potential for the occurrence of species of concern, especially western starflower, Constance's bittercress, red alder, pacific ninebark and Case's fitweed. Members of this guild also can be found in deciduous riparian communities (black cottonwood) at low elevations and willow mosaic communities. Small wet micro-habitats (seeps, springs, wet draws, marshes) within stands characterized by drier habitat types are also high potential habitats. All these communities the highest potential for the occurrence of the WFG and botanical surveys and clearences should be done by knowledgeable personnel prior to any project implementation.

All other habitat types within the cedar and western hemlock series (cedar/queencup beadlily, western hemlock/beadlily and western hemlock/menziesia) and all other series have a lower potential for occurrence of the WFG. Stands in young and immature age classes and small size classes outside riparian areas also have a lower potential for occurrence of the WFG.

Dry Forest Guild (DFG): this species guild includes xeric species of concern that are all listed as sensitive by the Forest Service:

Mimulus clivicola (bank monkey-flower)
Grindelia howellii (Howell's gumweed)
Calochortus nitidus (broad-friut mariposa) [suspected]

The DFG high potential habitats occur on elevations less than 4900 feet (most less than 4000 ft) in stands containing openings with shallow soil on easterly, southerly and westerly aspects in Grand fir/ninebark, Grand fir/white spiraea (HT codes 505-508), Douglas-fir/ninebark (HT codes 260-263), Douglas-fir/white spiraea (HT code 340), Douglas-fir/Idaho Fescue (HT code 220), Douglas-fir/Bluebunch wheatgrass habitat types (HT code 210) and the entire

Ponderosa pine series (HT code 100-190). Mimulus clivicola also seems to occur only on sites having greater than 45% slope. These dry open commmunities have the highest potential for the occurrence of the DFG and botanical surveys should be done by knowledgeable personnel prior to project implementation.

All other habitat types within the grand fir and Douglas-fir series and all other series (except Ponderosa pine) have a lower potential for occurrence.

High Elevation Guild (HEG): this species guild includes high elevation species of concern:

Listed sensitive:
Allotropa virgata (candystick)
Carex californica (California sedge)
Sedum rupicolum (Lanced-leaved sedum).

Other species of concern:
Astragalus bourgovii (Bourgeau's milkvetch)
Carex xerantica (dryland sedge)
Ivesia tweedyi (Tweedy's ivesia)
Larix lyallii? (alpine larch)
Pinus albicaulis (whitebark pine)
Rhododendron albiflorum (white rhododendron)

The high potential suitable habitat associated with the HEG are openings in Mt. Hemlock/beargrass (HT code 710-712), Mt. Hemlock/smooth woodrush (HT code 840), Subalpine fir/beargrass (HT code 690-694), Subalpine fir/smooth woodrush habitat types (HT code 830) and alpine larch-subalpine fir (HT code 860) and whitebark pine-subalpine fir communities (HT code 850) at elevations greater than 5000 feet. These habitats have the highest potential for the occurrence of the HEG and botanical surveys and clearances should be done by knowledgeable personnel prior to project implementation. All other habitat types in the Mt. hemlock and subalpine fir series and all other series have a lower potential for occurrence of high elevation plant species of concern.

Aquatic guild (AQU). This guild currently only contains one species, Howellia aquatilis (water howellia), listed as Threatened and suspected to occur on the St Joe. The high potential habitat is vernal pools, pond margins, and sloughs that seasonally flood and dry down in the summer.

2. Management activites:

The following flow chart is designed help managers and zone botany personnel with the decision, planning and project design process. This process does not negate the biological evaluation process mandated in FSM 2672.4 - 2672.43; BE's must still be prepared for "all forest service planned, funded, executed, or permitted programs and activities for possible effects on endangered, threatened, proposed, or sensitive species" (FSM 2672.4.). BE's must still be conducted or reviewed and approved by qualified Botanists. This process could be used in a programatic way to tier many activites across the St. Joe to a single BE for plant species of concern, including TES plants.

Decision tree for TESP guilds

1 - If activity/project area includes riparian areas, seeps, or springs then.....High Potential for WFG

OR

If stands in activity/project area contain areas with Cedar/Devils club, Cedar/lady-fern, cedar/maidenhair, cedar oak-fern, cedar/ginger, western hemlock/oak-fern, western hemlock/ginger habitat types at elevations less than 4500 feet in a mature age class then.....High Potential for WFG

If not above then, lower potential for WFG.....go to 2)

2) - If activity/project area include stands with openings in Grand fir/ninebark, Grand fir/white spiraea, Douglas-fir/ninebark, Douglas-fir/white spiraea, Douglas-fir/Idaho fescue, Douglas-fir/Bluebunch wheatgrass or Ponderosa pine habitat types, at elevations less than 4900 feet on west, south or east aspects, then.....High potential for DFG (if slope greater than 45% then.....Very High potential for Mimulus clivicola)

If not above then lower potential for DFG.....go to 3

3) - If activity/project area include stands with openings in mt. hemlock/beargrass, mt. hemlock/smooth woodrush, subalpine fir/beargrass, subalpine fir/smooth woodrush habitat types or alpine larch-subalpine fir, whitebark pine-subalpine fir communities, at elevations greater than 5000 feet, then.....High Potential for HEG

If not above then, lower potential for HEG.....go to 4)

4) Botanist document lack of habitat, write BE and proceed with activity.

Riparian and adjacent wet forest communities:

Over 50% of these communities have been lost or so modified that they no longer support WFG species of concern. Of the remaining acres (about 43,600) the following are recommendations to protect the remaining intact communities and species of concern and restore viability:

1. Manage populations. Management will be important to prevent the need for federal listing of certain species in the future. Management may include strategies to:

-survey habitat and locate new occurrences
-increase population numbers
-improve distribution by enhancing and creating habitat
-provide increased security when necessary
-minimize catastophic stochastic events that could threaten populations.

2. The remaining 10,190 acres (not designated old-growth) of mid-late seral wet cedar habitats adjacent to riparian areas should have minimal activity and preferably be designated as refugia, SIA's or replacement old-growth.

3. Efforts to restore riparian communities must consider plant species of concern. Restoring riparian communities that could link isolated population together and improve long term viability for species of concern should be viewed as a co-priority with other objectives.

4. Restoration work in riparian communities needs to minimize any physical impacts from machinery, re-channelling and stabilization efforts on any isolated plant species of concern populations. Any activities in riparian and wet cedar communities, including restoration work, must not further fragment or directly impact existing populations.

5. The use of long lived exotic (grass) seed mixtures in riparian (and other) areas for soil stabilization work must cease. Using short-lived non-persistent exotic grasses should be used while sources of adapted native species are developed.

Dry xeric communities:

1. Manage populations. Management may include strategies to:

-survey and locate new occurrences
-monitor subset of existing populations to assess trends
-increase population numbers
-improve distribution by creating habitat
-minimize catastophic stochastic events that could threaten populations
-minimize impacts from invasive exotic species

Subalpine communities:

1. Manage populations. Management may include strategies to:

-survey and locate new occurrences
-monitor subset of existing populations to assess trends

-minimize catastophic stochastic events that could threaten populations

3. Opportunities for enhancement:

The species of concern guilds are mostly made up of species that occupy mid to late seral or climax plant communities. A few species can be found in more seral habitats and opportunites exist to enhance these populations.

Within the WFG, Cardamine constancei (Constance's bittercress) and Trientalis latifolia (western starflower), Corydalis caseana (Cases's fitweed), Alnus rubra (red alder), Physocarpus capitatus (pacific ninebark), Viburnum edule (high-bush cranberry) are sometimes found in riparian areas and wet cedar habitats that have experienced some level of recent disturbance (fire, light logging, road corridors). These species seem to be favored by light disturbance. Many of the existing populations in mid seral to climax riparian communities are small and restricted to disturbed microsites. Management activities have the opportunity to increase existing populations numbers and distribution in these habitats by light disturbance such as: understory burning, overstory salvage, and thinning.

A member of the DFG, Mimulus clivicola (bank monkey flower) exist in xeric habitats prone to disturbance, especially fire and light soil disturbance from big game. Controlled fires or light soil disturbance in these xeric habitats could also improve populations by creating more habitat, if nearby populations can recolonize unoccupied habitat.

II. Research Natural Areas and Special Interest Areas.

Research Natural Areas are an array of significant and representative "natural" ecosystems that have been established as areas for baseline research and long term monitoring, areas to perpetuate and maintain certain unique and rare ecosystems and their inherent processes, communities and rare elements. Special interest areas are generally smaller sites set aside for a specific unique feature.

Three RNA's and three SIA's exist on the St. Joe: Five lakes Butte, Upper Fishhook, Theriault Lake and Hobo Cedar Grove Botanical area, Sandhouse Cedar Grove and the Emerald Creek Paleontological Area. The total acreage of the three RNA's is 736 acres, or .10% of the National Forest. The three SIA's encompasses 354 acres, or .06% of the National Forest. The total acres for these unique areas is 1090 acres, or .17% of the national forest.

One concern for these unique areas is that mineral rights have not been withdrawn and these special areas are potentially at risk from mining claims. Pursuing mineral withdrawn for these areas should be given a priority.

Other areas have been proposed for RNA/SIA status on the St. Joe and designating certain unique areas representing other rare or unique elements is desirable.

No cedar riparian communities or aquatic communities have been set aside for long term monitoring or research on the St. Joe. A few remaining intact watersheds containing cedar/hemlock communities exists on the St. Joe, these are:

Black Prince creek
Skookum creek
Foehl creek
Fly Creek
Mosquito Creek
Siwash creek
Lower portion of the Little North-fork of the Clearwater (along trail #50)

The Mallard-Larkins primitive area encompasses 78,500 acres of high-elevation, roadless habitat. This area encompasses about 12% of the national Forest, has been a proposed wilderness area for many years and essentially is managed as such.

Appendix A.

Table 1. St. Joe plant species with coastal affinities and occurrence status:

Trees		Occurrence Status
Western redcedar	Thuja plicata	Common
Grand fir	Abies grandis	Common
western hemlock	Tsuga heterophylla	Common
western white pine	Pinus monticola	Common
mountain hemlock	Tsuga mertensiana	Common
Red Alder	Alnus rubra	Uncommon
Understory trees and woody shrubs		
Rocky Mt. Maple	Acer glabrum	Common
Service berry	Amelanchier alnifolia	Common
Tall oregon grape	Berberis aquifolium	Common
Cascade oregon grape	Berberis nervosa	Uncommon
Paper birch	Betula papyrifera	Common
Red-stem ceanothus	Ceanothus sanguineus	Common
little pipsissewa	Chimaphila menziesii	Common
Red-Osier Dogwood	Cornus stolonifera	Common
Beaked hazelnut	Corylus cornuta	Rare
Black hawthorne	Crataegus douglasii	Common
Suksdorf's Hawthorne	Crataegus suksdorfii	Uncommon
Ocean Spray	Holodiscus discolor	Common
Western trumpet	Lonicera ciliosa	Common
Fool's huckleberry	Menziesia ferruginea	Common
Devil's club	Oplopanax horridium	Common
Mountain lover	Pachystima myrsinites	Common
Syringa	Philadelphus lewisii	Common
Pacific ninebark	Physocarpus capitatus	Uncommon
Bittercherry	Prunus emarginata	Common
Cascara	Rhamnus purshiana	Common
White Rhododendron	Rhododendron albiflorum	Uncommon
Red-flowered currant	Ribes sanquineum	Rare
Wild rose	Rosa gymnocarpa	Common
Thimbleberry	Rubus parviflorus	Common
Pacific blackberry	Rubus ursinus	Common
Scouler's willow	Salix scouleriana	Common
Sitka willow	Salix sitchensis	Common
Blue elderberry	Sambucus cerulea	Common
Sitka mountain-ash	Sorbus sitchensis	Common
Hardhack	Spiraea douglasii	Common
Snowberry	Symphoricarpos albus	Common
Creeping snowberry	Symphoricarpos mollis	Common
Pacific Yew	Taxus brevifolia	Common
Big huckleberry	Vaccinium membranaceum	Common
High-bush cranberry	Viburnum edule	Uncommon
Herbaceous forbs, ferns and sedges:		
Deerfern	Blechnum spicant	Rare
California sedge	Carex californica	Rare
Henderson's sedge	Carex hendersonii	Rare
Vari-leaf Collomia	Collomia heterophylla	Common
Bleeding heart	Dicentra formosa	Uncommon

White shooting star	Dodecatheon dentatum	Uncommon
Phantom orchid	Eburophyton austiniae	Uncommon
Oregon wintergreen	Gaultheria ovatilfolia	Common
Pacific common rush	Juncus effusus var pac.	Common?
Northwestern twayblade	Listera caurina	Common
Yellow skunk cabbage	Lisichitum americanum	Common
Leafy mitrewort	Mitella caulescens	Common
Merten's Saxifrage	Saxifraga mertensiana	Common
Andersons Holly fern	Polystichium andersonii	Uncommon
Western Stenanthium	Stenanthium occidentale	Common
cool wort foam flower	Tiarella unifoliata	Common
western star flower	Trientalis latifolia	Rare
Redwood violet	Viola sempervirens	Uncommon
Round leaved violet	Viola orbiculata	Common

Table 2. Regional Foresters list of sensitive plant species.

ST. JOE NATIONAL FOREST
ST. JOE, ST. MARIES AND LITTLE NORTH FORK OF CLEARWATER ECOSYSTEMS
June 1994 SENSITIVE PLANT LIST[1]
June 30, 1994

Threatened	
Howellia aquatilis	water howellia
Sensitive	
Agrostis oregonensis	oregon Bentgrass
Allotropa virgata	candystick
Asplenium trichomanes	maidenhair spleenwort
Blechnum spicant	deerfern
Botrychium ascendens	upswept moonwort
Botrychium crenulatum	dainty moonwort
Botrychium lanceolatum var. lanceolatum	triangle moonwort
Botrychium minganense	Mingan moonwort
Botrychium montanum	western goblin
Botrychium pinnatum	northwestern moonwort
Botrychium simplex	least moonwort
Calochortus nitidus	broad-friut mariposa
Cardamine constancei	Constance's bittercress
Carex californica	California sedge
Carex hendersonii	Henderson's sedge
Cypripedium fasciculatum	clustered lady's slipper
Grindelia howellii	Howell's gumweed
Mimulus clivicola	bank monkey flower
Sedum lanceolatum var. rupicolum	lance-leaved sedum
Thelypteris nevadensis	Sierra woodfern
Trientalis latifolia	western starflower

[1] Based on Region 1 Sensitive Plant List June 1994.